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Short Communication

New records and a comprehensive checklist of mammoth wasps (Hymenoptera, Scoliidae) in Panama

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Abstract

A list of Scoliidae species recorded in Panama is presented. Considering the recent taxonomic updates made on this tribe of wasps, as well as the lack of a formal study on its geographical distribution, richness, and species diversity in Panama, this study aimed to document the existing species in the country. Based on literature records and an examination of 383 specimens, we found a total of 13 species and 7 genera. The following two species and one subspecies are recorded for the first time in Panama: *Dielis tolteca* (Saussure, 1857), *Pygodasis hyalina* (Saussure, 1864), and *Pygodasis ephippium wagneriana* (Saussure, 1864).

Key words: Biodiversity, Campsomerini, neotropics, Scoliini

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Introduction

The Scoliidae Latreille, 1802, known as mammoth wasps or digger wasps, are natural biological control agents (Abbate et al. 2018). Females dig in the soil in search of beetle larvae (usually Scarabaeidae), and upon encountering a suitable host, they use their sting to inject a paralyzing venom and then deposit an egg on the host; the larva feeds externally, eventually killing the host (Clausen 1978). Many of the Coleoptera larvae parasitized by the larvae of these wasps are crop pests (Fernández 2006), and thus scoliids are considered beneficial.

Scoliids have a cosmopolitan distribution, and according to Osten (2005), there are approximately 560 described species. The family has a complex nomenclature and has been subject to many changes by Argaman (1996) and Osten (2005), almost without discussion or clear justification. Argaman's classification mentions four subfamilies: Campsomerinae, Colpinae, Proscoliinae, and Scoliinae; Osten's classification proposes three subfamilies: Archaeoscoliinae (fossil), Proscoliinae, and Scoliinae, divided into Scoliini and Campsomerini. The rather chaotic state of the scoliid taxonomy has been discussed by Elliott

(2011). Therefore, there is no single source that can be taken as a guide for classification at the generic level (Taylor and Barthélémy 2021).

In the Americas, Scoliidae is a relatively poorly studied group. In addition to a few general publications (Bradley 1957, 1964), some taxonomic and distributional information exists for Brazil (Fox 1896), Venezuela (Bradley 1945), Costa Rica (Finnamore and Hanson 1995), Colombia (Fernández and Cubillos 1999), Florida (Grissell 2007), Chile (Pizarro-Araya et al. 2021), Mexico (Ramírez-Guillén et al. 2022), and Panama (Collantes and Pitti 2024). It is worth noting that although this family is cosmopolitan, most species are tropical (Brothers and Finnamore 1993).

In Panama, scoliids are grouped into two tribes of the subfamily Scoliinae: Campsomerini and Scoliini. After Cameron (1893), Scoliidae has been discussed by Añino et al. (2020), who recorded *Scolia rufiventris* for Central America and presented aspects related to the flight seasonality of *Scolia guttata*, both species belonging to the tribe Scoliini. The tribe Campsomerini has often been considered to be represented in the Neotropics by just a single genus, *Campsomeris* (e.g., Hanson 2006). In this work, we follow the classification proposed by Osten (2005), whereby the subgenera of *Campsomeris* were considered valid genera, eleven in total. Considering the lack of knowledge about the diversity and distribution of Campsomerini species found in Panama, their ecological importance, and recent taxonomic updates, this study aims to present a list of species that will help improve information on diversity and distribution and report for the first time two species and one subspecies for Panama.

Methods

The literature review was performed from the library in the Museo de Invertebrados G. B. Fairchild, Universidad de Panamá (MIUP), using the Web of Science and Scopus databases and search terms related to Scoliidae, giving priority to any information on the presence of these wasps in Panama. In addition, a total of 383 specimens deposited in the reference collection of the MIUP were examined. The specimens were collected between the years 1977 and 2023 with Malaise traps or manually with entomological nets, and each of them was mounted on entomological pins. This review included the creation of a database with Microsoft Excel, which contains the following information: name of species, author and year of description, sex of each specimen, location, geographical coordinates in UTM, collection dates, and collector. We follow the Darwin Core format with each of the specimens processed. The specimens were identified by L. Ramírez-Guillén in 2023, using the taxonomic keys of Bradley (1945, 1957), Ramírez-Guillén et al. (2022), and the previous study of some type material. The Osten (2005) classification of genera was followed because Osten's catalogue, though confusing, still provides a clearer division of genera, especially when considering Argaman's chaotic classification.

Results

We examined 198 specimens of Scolini and 185 of Campsomeri, for a total of 383 specimens. Currently, 7 genera and 13 species are recorded from Panama. In the tribe Scoliini, two species of *Scolia* are present (Añino et al. 2020), while Campsomerini is represented by the remaining 6 genera and 11 species,

including the first records of *Dielis tolteca* (Saussure, 1857), *Pygodasis hyalina* (Saussure, 1864), and *Pygodasis ephippium wagneriana* (Saussure, 1864).

Checklist of Scoliidae from Panama
Family: Scoliidae
Subfamily: Scoliinae
Tribe: Campsomerini

***Aelocampsomeris brethesi* (Bradley, 1927)**

***Aelocampsomeris variegata* Fabricius, 1793**

***Dielis dorsata* (Fabricius, 1787)**

***Dielis tolteca* (Saussure, 1857)**

Distribution. El Salvador, United States, Guatemala, Haiti, Honduras, Mexico, Nicaragua (Ramírez-Guillén et al. 2022), Panama (first record presented in this study).

Material examined. Fig. 1; Suppl. material 1.

***Lissocampsomeris columba* (Saussure, 1858)**

***Lissocampsomeris wesmaeli* (Lepeletier, 1845)**

***Pygodasis ephippium ephippium* (Say, 1837)**

***Pygodasis ephippium wagneriana* (Saussure, 1864)**

Distribution. Ecuador, Colombia, Costa Rica (Bradley 1945), and Panama (first record presented in this study).

Material examined. Fig. 1; Suppl. material 1.

***Pygodasis hyalina* (Saussure, 1864)**

Distribution. Argentina, Brazil, Colombia, México, Guyana (Bradley 1945), and Panama (first record presented in this study).

Material examined. Fig. 1; Suppl. material 1.

***Pygodasis vittata banksi* (Bradley, 1945)**

***Stygocampsomeris servillei* (Guérin-Meneville, 1838)**

***Xanthocampsomeris hesterae* (Rohwer, 1927)**

Tribe: Scoliini

***Scolia guttata guttata* Burmeister, 1853**

***Scolia rufiventris* Fabricius, 1804**

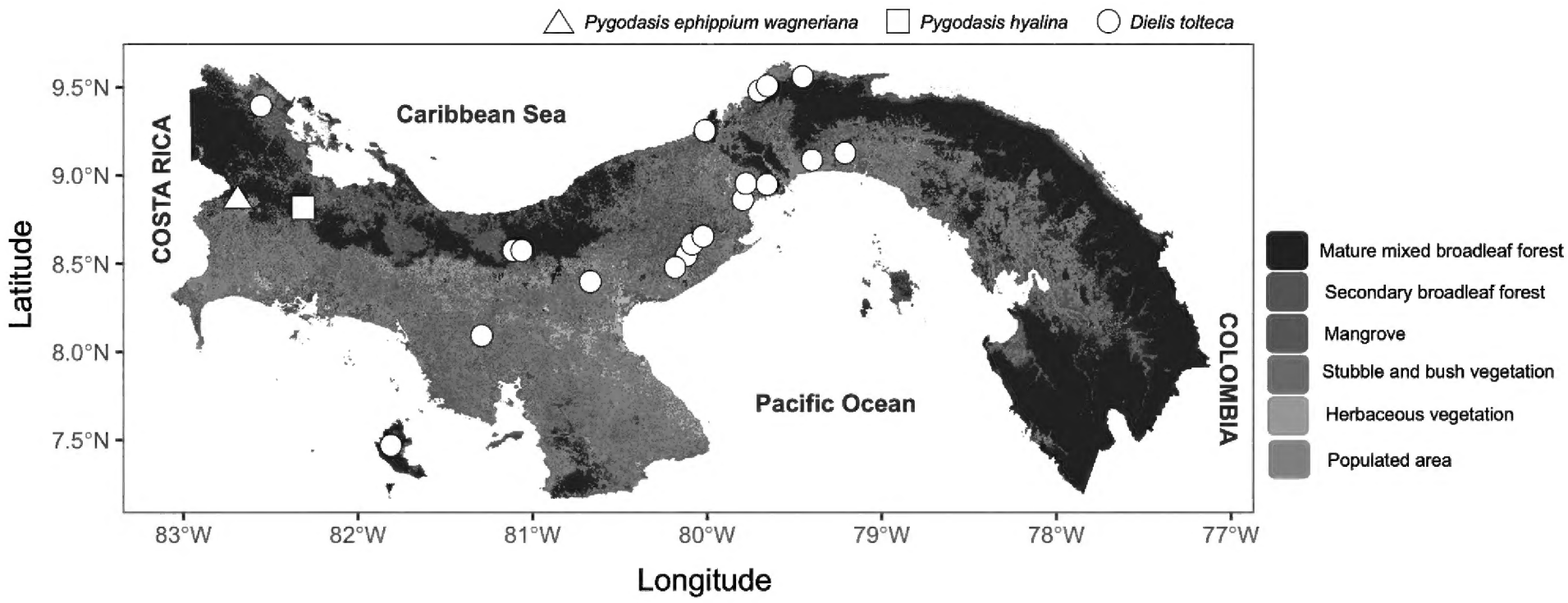

Figure 1. Distribution map of two species and one subspecies of Scoliidae reported for the first time from Panama.

Discussion

A single putative specimen of *Campsomeris atrata* (Fabricius, 1775) was recorded from Panamá (David, Chiriquí) by Cameron (1893: 227, male). The author stated that the specimen corresponded to Saussure and Sichel's (1864: 214) description of the Patagonian variety. In Cameron's (1893) description, the specimen shows forewings with a hyaline red colour and a violet apex; metasoma with an almost continuous yellow spot on the first segment and a large irregular yellow spot on each side of terga 2–4, with the spot of T2 being the largest. Cameron's description does not agree with the completely black metasoma of *C. atrata*, which is known from the Caribbean (Hispanolia, Cuba, Jamaica, and Puerto Rico). Therefore, *C. atrata* is probably not found in Panama and has not been included in the checklist presented in this work.

Finally, two species that could be present in Panama, due to their distribution in South America and Mesoamerica, are *Pygodasis ianthina* (Bradley, 1945) and *Rhabdotomeris rokitanskyi* (Dalla Torre, 1897).

Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

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Author contributions

Conceptualization: YA, RAC, PEH. Data curation: YA, RC, LR, DD, JG. Formal analysis: YA, RAC, CR, LR. Funding acquisition: YA. Investigation: All authors. Writing—original draft: YA, RC, LR. Writing—review and editing: all authors.

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Data availability

All of the data that support the findings of this study are available in the main text or Supplementary Information.

References

Abbate A, Campbell J, Bremer J, Kern Jr WH (2018) The introduction and establishment of *Campsomeris dorsata* (Hymenoptera, Scoliidae) in Florida. The Florida Entomologist 101(3): 543–545. https://doi.org/10.1653/024.101.0334

Añino YJ, Cambra RA, Windsor DM, Zúñiga R, Quintero D (2020) Review of *Scolia* (Hymenoptera, Scoliidae) from Central America, including seasonal flight activity in *Scolia guttata*. Acta Biologica Colombiana 25(2): 202–209. https://doi.org/10.15446/abc.v25n2.77590

Argaman Q (1996) Generic synopsis of Scoliidae (Hymenoptera, Scolioidea). Annales Historico-Naturales Musei Nationalis Hungarici 88: 171–222.

Bradley JC (1945) The Scoliidae (Hymenoptera) of Northern South America, with special reference to Venezuela. I. The genus *Campsomeris*. Boletín de Entomología Venezolana 4: 1–36.

Bradley JC (1957) The taxa of *Campsomeris* (Hymenoptera, Scoliidae) occurring in the New World. Transactions of the American Entomological Society 83: 65–77.

Bradley JC (1964) Further notes on the American taxa of *Campsomeris* (Hymenoptera, Scoliidae). Entomological News 25: 101–108.

Brothers D, Finnamore A (1993) Superfamily Vespoidea. In: Goulet H, Huber JT (Eds) Hymenoptera of the World: An Identification Guide to Families. Research Branch Agriculture Canada, Ottawa, 161–278.

Cameron P (1893) Fam. Scoliidae. Vol. II. London. Biologia Centrali-Americana. Insecta. Hymenoptera (Fossores), 222–234.

Clausen CP (1978) Introduced parasites and predators of arthropod pests and weeds: A World review. United States Department of Agriculture, Washington D.C., 545 pp.

Collantes R, Pitti J (2024) Distribución actualizada para Panamá de *Pygodasis* (*Campsomeris*) *ephippium ephippium* (Say 1837) (Hymenoptera, Scoliidae). Mesoamericana 26(1): 29–32. https://doi.org/10.48204/j.mesoamericana.v26n1.a5078

de Saussure H, Sichel J (1864) Catalogue des especès de l'ancien genre *Scolia*, contenant les diagnoses, les descriptions et la synonymie des espèces, avec des remarques explicatives et critiques. Henri Georg, Genéve / V. Masson et Fils, Paris. https://doi.org/10.5962/bhl.title.9323

Elliott MG (2011) Annotated catalogue of the Australian Scoliidae (Hymenoptera). Technical Reports of the Australian Museum 22: 1–17. https://doi.org/10.3853/j.1835-4211.22.2011.1562

Fernández F (2006) Familia Scoliidae. In: Fernández F, Sharkey MJ (Eds) Introducción a los Hymenoptera de la Región Neotropical. Sociedad Colombiana de Entomología y Universidad Nacional de Colombia, Humboldt, Colombia, 557–558.

Fernández F, Cubillos WA (1999) Capítulo II, Las avispas escólidas (Hymenoptera, Scoliidae) de Colombia. In: Amat G, Andrade MG, Fernández F (Eds) Insectos de Colombia volumen II. Editora Guadalupe LTDA, Bogotá, Colombia, 35–53.

Finnamore AT, Hanson PE (1995) Scoliidae. In: Hanson PE, Gauld ID (Eds) The Hymenoptera of Costa Rica. Oxford University Press, Oxford, 555–560.

Fox WJ (1896) Contributions to a knowledge of the Hymenoptera of Brazil. No. 1. Scoliidae. Proceedings. Academy of Natural Sciences of Philadelphia 48: 292–307.

Grissell EE (2007) Scoliid wasps of Florida, *Campsomeris*, *Scolia* and *Trielis* spp. (Insecta: Hymenoptera: Scoliidae. EDIS. https://doi.org/10.32473/edis-in329-2000

Hanson PE (2006) Familia Scoliidae. In: Hanson PE, Gauld ID (Eds) Hymenoptera de la Región Neotropical. Memoirs of the American Entomological Institute 77: 614–616.

Osten T (2005) Checkliste der Dolchwespen der Welt (Insecta, Hymenoptera, Scoliidae). Bericht der Naturforschenden Gesellschaft Augsburg 62: 1–62.

Pizarro-Araya J, Alfaro FM, González-Dossi M, Mondaca J (2021) New records of *Campsomeris servillei* (Guérin-Méneville, 1831) (Hymenoptera, Scoliidae) and current distribution in Chile. Gayana (Concepción) 85(1): 90–94. https://doi.org/10.4067/S0717-65382021000100090

Ramírez-Guillén LD, Falcon-Brindis A, Gómez B (2022) The Scoliidae wasps (Hymenoptera, Scolioidea) of Mexico: Taxonomy and biogeography. Zootaxa 5214(1): 47–88. https://doi.org/10.11646/zootaxa.5214.1.2

Taylor C, Barthélémy C (2021) A review of the digger wasps (Insecta, Hymenoptera, Scoliidae) of Hong Kong, with description of one new species and a key to known species. European Journal of Taxonomy 78: 1–92. https://doi.org/10.5852/ejt.2021.786.1607

Supplementary material 1

Scoliidae records from Panama

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